HOW MUCH WATER IS IN MY BACKYARD?

Objectives:

Students will:

- investigate how to access water data for streams or rivers in their area,
- track water flow in a stream or river near where they live,
- investigate factors that may affect streamflow,
- and prepare a presentation of their findings and speculate on how their community may be impacted by streamflow.



Materials:

- Computers with Internet access
- Presentation materials such as overhead transparencies, paper to print out
- Selected webpages or even computer disks to store Power Point type presentations

Background:

On June 9, 1972 it started to rain in the Black Hills region just west of Rapid City, South Dakota. This rainfall led to one of the most devastating floods in recent American history. The flood began with about 11 inches (28 cm) of rain falling on the Rapid Creek drainage basin (watershed) just below Pactola Dam. As much as 15 inches (38 cm) of rain fell in less than 6 hours in some locations in that basin. This resulted in peak water discharges in Rapid Creek of about 50,000 ft³/sec (1420 m³/sec). That is enough water to completely fill an Olympic sized pool every second!!!. The losses that resulted from the flood were extreme in Rapid City. At least 238 people died and hundreds of homes and businesses were damaged or destroyed. The US Army Corps of Engineers estimated the flood damage at \$128 million.

Partly in response to the Rapid City disaster, Congress established the Federal Emergency Management Agency (FEMA) in 1979. FEMA's mission is "to reduce loss of life and property and protect our nation's critical infrastructure from all types of hazards through a comprehensive, risk-based, emergency management program of mitigation, preparedness, response and recovery."

Part of FEMA's preparedness program, as it relates to flooding, was to direct the United States Geological Survey (USGS) to access and monitor all the streams in the United States for flood potential. Thus, over the years, the USGS has installed stream-monitoring gauges on all major and minor waterways in the nation that have the potential for flooding. With the advent of the Internet, many of these stream-gauging stations have been linked via satellite uplink and real-time hydrologic data is available to anyone with a computer and Internet access.

Procedure:

- 1. Connect to the USGS Real-Time Water Data website. Point your web browser to http://water.usgs.gov/realtime.html
- 2. Using the "State List, State Map, or 10 nearest stations" choice on the Real-Time Water Data webpage; locate a stream near you that you would like to investigate. For example, if you click on your state, a page will be displayed showing all the streams in your state with continuous monitoring equipment that you can access via the Internet. If you click on a "Station Number" you will be directed to that station's streamflow and/or stage data for the past week. A wealth of data about this station is available by using the hyperlinks

- provided on this page. Take some time to investigate the available data, download a presentation-quality graph of your station, and write down the station number and name so that you can more easily get even more information about this station.
- 3. Using the hyperlinks provided on the USGS site or by surfing the web, you should be able to find information about rainfall over the drainage basin where your stream gauge is located. Save or record that data and make comparisons with how much water is flowing in the stream. What kind of relationship can you determine between rainfall and streamflow? Other factors that might effect streamflow include temperature, cloud cover, snow melt, etc. What has the weather been like lately in the stream basin area and can you see any relation between these factors and the streamflow? If so, what are they?
- 4. Monitor your stream basin and the weather for at least a month and see what kinds of relationships become apparent when you look at the weather, streamflow or other data that you might think is pertinent to monitoring your stream. Data for the past month(s) may be found using hyperlinks on the pages you are browsing. Incorporate these data into your analysis.
- 5. Present your conclusions to your class along with any speculations you might have relating the effect of your stream on people living in your area. What might people be doing that may affect the streamflow?

Hints:

- Some of the terms used to describe streamflow on this website may not be familiar to you. Refer to the vocabulary list included in this hydrology unit for better understanding. On the USGS website, try out various hyperlinks and you may find the definitions to the terms you may not know. Using the web itself may also help you define unfamiliar terms.
- 2. There are hyperlinks to explanations of the stream-gauging program in the United States on the USGS site. You may find these interesting reading to get an overall perspective on this entire program. This may help you understand the individual stream basin you are investigating.
- 3. Looking at other streams near your chosen stream may help you get a better perspective on the stream you are investigating. In some cases, the same stream has more than one gauge. By looking at adjacent streams, or different gauges on the same stream, you may gain a better understanding of the water where you live. Compare your stream's flow to the streamflows that other students in your class are investigating. What conclusions can be reached by comparing the streams investigated by the entire class?

Discussion:

Going back to the Runoff Race activity, how would drainage or potential flooding along a stream be changed by vegetation or the lack of it. What difference would there be if there were roads and parking lots or if there were trees and grass?